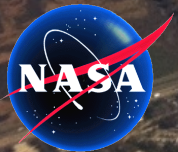


NASA Ames Research Center Update



Courtesy: M. Fellows, January 31, 2011



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Process for Assessing Climate Risks to Center Assets

- Structure for assessing Center assets to determine climate risks (per GISS model):
 - Built Systems and Subsystems
 - Human Resources
 - Natural Environment



Areas	Acreage
*Ames Campus	234
*NASA Research Park (NRP)	213
*Bay View	95
*Eastside/Airfield	840
Air National Guard	112
Wetlands / Other	280
Runway Protection Zone (RPZ)	35.4
TOTAL (Approx.)	1,800

***Ames Area Developments**

Climate Variable

Potential Impacts

Sea Level Rise

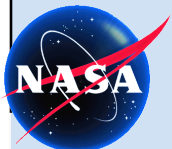
Partial inundation of Center including portions of Airfield, buildings at lower elevations, and storm water management system; inundation of transportation corridors and wastewater treatment plants; reduced emergency response capabilities; salinization of groundwater, disruption to South Bay Salt Ponds restoration program and reduction of wildlife and wetland habitats

Overall Increased Temperature

Increased cooling costs in the summer; decreased heating costs in the winter; potential stress to building materials and systems; increased water consumption for cooling and landscape irrigation; decreased water availability because of earlier snow melt in the Sierras

Precipitation Changes

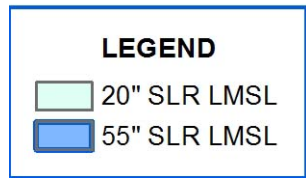
Possibility of reduced reliability of fresh water supply especially late in the water year from diminishing snowpack in Sierra Nevada range; reduced water flow for hydroelectric power late in the water year; possibility of increased flood risk during winter and spring



Sea Level Rise Projections

Year	Emissions Scenario	Range of Models, inches (cm) above 2000	Average of Models, inches (cm) above 2000
2030		5-8 in (13-21 cm)	7 in
2050		10-17 in (26-43 cm)	14 in (36 cm)
2070	Low (B1)	17-27 in (43-70 cm)	23 in (59 cm)
	Medium (A2)	18-29 in (46-74 cm)	24 in (62 cm)
	High (A1FI)	20-32 in (51-81 cm)	27 in (69 cm)
2100	Low (B1)	40 in (101 cm)	31-50 in (78-128 cm)
	Medium (A2)	47 in (121 cm)	37-60 in (95-152 cm)
	High (A1FI)	55 in (140 cm)	43-69 in (110-176 cm)

SLR Local Mean
Sea Levels
Referenced to
NAVD88



Source:
TetraTech



Inundation by SLR in case of levee failure



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Efforts to Assess Risk or Plan Adaptation

- Downscaling climate projections of future changes in precipitation
- Analyzing impacts of sea level rise with extreme high tides and storm surges at the Center
- Analyzing impacts of changes in frequency and intensity of extreme storms on flooding of the center
- Analyzing impacts of changes in climate (precipitation + temperatures) on watershed-wide runoff, water availability, and ecosystem health (forest growth, etc)



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Challenges

- Conveying the need for adaptation while dealing with scientific uncertainties
- Bridging the gap between scientific output, assessing risk, engineering solutions, decision-makers' objectives, and the required funding to implement effective mitigation strategies
- Magnitude of scope/Area of impact-The South Bay radius

Activities/Ames Research Center

Report-Agency-wide Quarterly ViTS (Jan. 25, 2013)

Climate Adaptation

- Studies
 - NASA-funded TetraTech team 3-year study to predict local change in “storminess”
 - NASA Ames team funded to study effects on Center and regional stormwater runoff and ecosystem health, including wetland habitats
 - Moore Foundation funding studies in the Bay in coordination with the Silicon Valley Leadership Group (NASA Ames is a liaison member)
- Wetlands Restoration (So. SF Bay Salt Pond Restoration to tidal marsh)
 - NASA Ames is cooperating agency on USFWS-led project to restore 15,000 ac salt ponds to north of Ames (Mitigation for Extension of SFO into Bay)
 - NASA Ames is cooperating agency on associated Army COE flood mitigation EIS
- ClimateWire visited site and published 2 articles with map
- Operations and Science co-chaired panel at December AGU meeting
- Navy completed PCB clean up of Storm Water Retention Pond
- 400,000 gal water tank completed; additional water tank planned
- NASA Ames Development Plan projects and activities consider risk



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Activities/Collaboration Within Ames

- Gathering consensus on Climate impact at the Center
- Changing the timeline of climate change impact from “fifty years from now,” to “now.”
- Initiating Center-wide collaboration including:
 - Protective Services (Emergency Management/Planning & Emergency Operations Center)
 - Earth Science-Climate Adaptation Science Investigation (CASI)
 - Master planning, Facilities Engineering, O&M
 - Center Ops
 - Health and Safety



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Activities/Collaboration With the Neighboring Community

- **Silicon Valley 2.0:** A Climate Action and Adaptation Plan for Strategic Growth, Reliable Infrastructure, Working Ecosystems, and a Healthy and Prosperous Region
- **FEMA-San Francisco Bay Area:** Federal Emergency Mgmt Agency
- **OCOF-Our Coast Our Future:** online maps and tools to help understand, visualize, and anticipate vulnerabilities to sea level rise & storms within the bay
- **South Bay Salt Pond Restoration Project:** the project will restore 15,100 acres of industrial salt ponds to a rich mosaic of tidal wetlands and other habitats; Provide wildlife-oriented public access and recreation; Provide for flood management in the South Bay



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Next Steps-Vulnerability and Risk Assessment

- Overlay Critical / Important Assets with Inundation Maps
- Assess for each Asset, for each Scenario:
 - Exposure (is it inundated and to what depth?)
 - Sensitivity (can it accept temporary inundation or it is compromised?)
 - Adaptive Capacity (strategies to make asset resilient to SLR)
- Coordination with Planned Projects